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AND *AG*
FILE: ED-183F

9 August 1960

MEMORANDUM FOR THE RECORD

SUBJECT: Nuclear Timer, Initial Contractor's Visit

1. On 4 August [redacted] and the undersigned, TSD/EB, visited [redacted], New York, N. Y. for the purpose of project familiarization, personnel introduction, and facility inspection in connection with the change in project responsibility from TSD/CB to TSD/EB.

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2. The following personnel from Radiation Research Corporation were contacted:

[redacted] President - cleared and witting
- Director of Research, cleared and witting
Project Engineer, uncleared and unwitting (clearance in process)

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The following [redacted] are cleared and witting:

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[redacted] - Secretary and Security Officer
Comptroller
- Executive Vice President

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[redacted] are changing their location from NYC to Long Island in the near future.

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3. Attached is the basic circuit diagram for the nuclear timer. The main element in the timer is the radio-isotope battery. Attached also is a schematic diagram and explanation of battery function. The nuclear timer primarily operates by releasing an energy pulse through a diode discharge tube to a mechanical counter. The energy build up is accomplished by a low leakage condenser which is charged at a fixed rate. A current regulator is used in the circuit to furnish constant current to the condenser thereby insuring a fixed charging rate or energy build up time. The rate of capacitance charge is proportional to the current and voltage applied across the condenser. $t = C V$ Various time increments of energy build up are determined by the value of the capacitor and current regulator selected. A voltage regulator is incorporated in the timer circuit for the purpose of limiting the output battery voltage from 3000 to 1300 volts. Since the current regulator has a maximum supplied voltage rating of 1500 volts it is necessary to limit the battery output to 1300 volts. It has been necessary for Radiation Research to produce their own current regulators and low leakage capacitors in order to accomplish the desired objectives. The discharge diode is limited by its ability to withstand charge build up on the glass tube enclosure which causes premature discharge.

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4. The radioactive battery material is Krypton 85 and has a half-life of ten years. Krypton 85 is an inert gas. Although the Krypton gas is radioactive it does not metabolize in the human body and is therefore non-lethal. The maximum current available from any one curie source is 5.9×10^{-9} amps. The battery action phenomena is accomplished by the emission of ³ particles from the Krypton 85 source. These particles pass through a conducting collector and give off 3.7×10^{10} electrons/sec. The electron flow is limited by the back scattering properties of the source being used. Voltage build up of 3000 V, at 5.9×10^{-9} amps, is accomplished with the Krypton battery.

5. At present there are six timers under test; 2- 24 hr., 2-5 hr., 2-2 hr., and [] is to convert the 2-2Hr. timers to 2-24 hour timers. Radiation Research was informed that we would be interested only in a timer for 30 days to one year. It is technically advantageous to limit such a timer to setting increments of not less than 24 hours. In the past Radiation Research has not been furnished definite guidance as to what the timer was to accomplish or the final requirements for such a device. TSD/EB intends to furnish guidance and specify requirements.

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6. It was brought to our attention by [] that the GE diode experiences a charge build up upon the glass enclosure after a period of sixty days which causes the diode to discharge. [] TSD/EB, was informed of this since it might apply to the anti-disturbance switch. Also the electrical circuit for this switch will be investigated for the purpose of incorporating a nuclear battery source.

CHARGE

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7. As soon as the timer requirements are determined, the contractor will be visited again. In the interim the TSD/CB program will be completed and the final report worked on.

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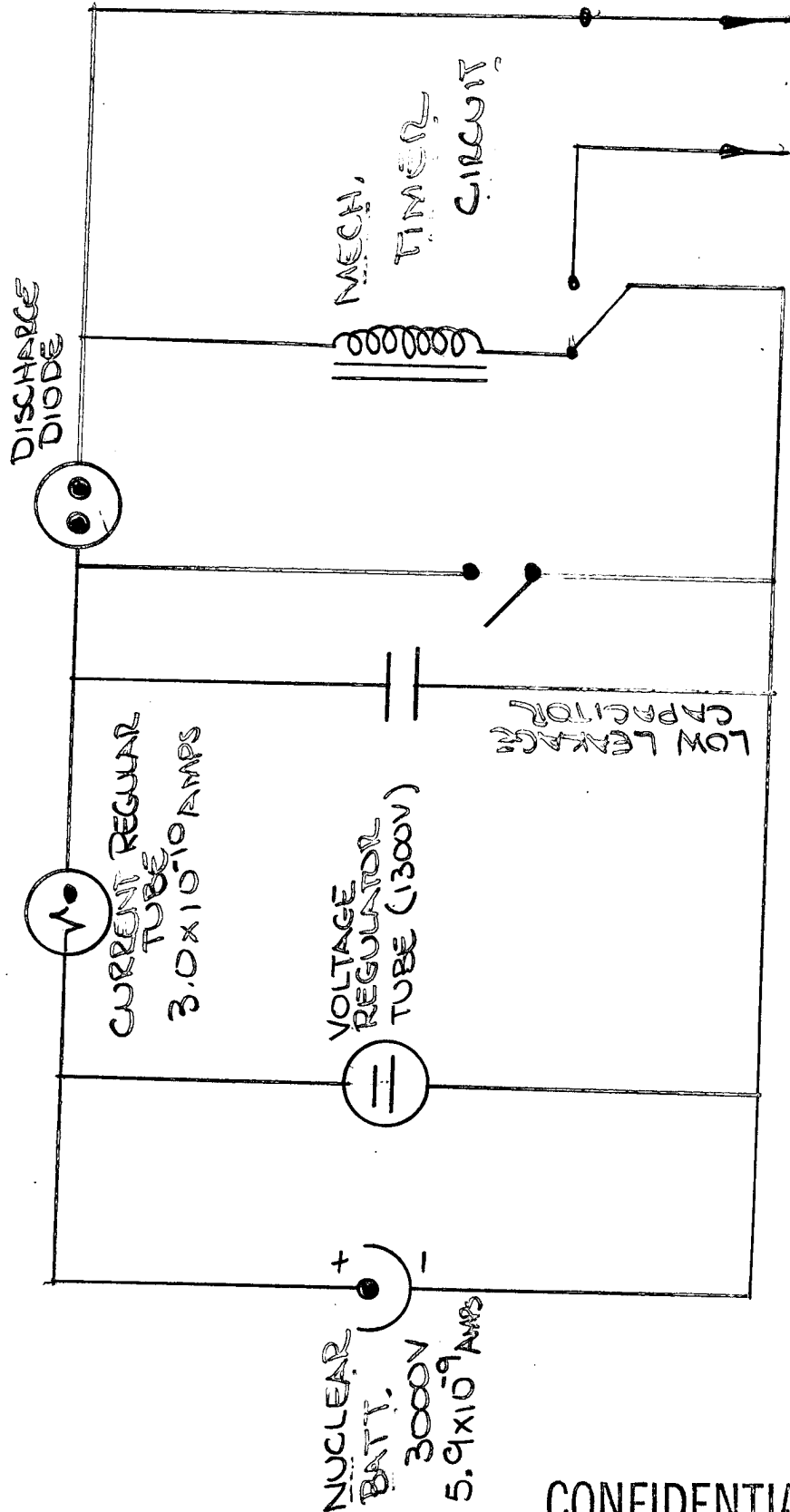
Attachments
Drawings (2)

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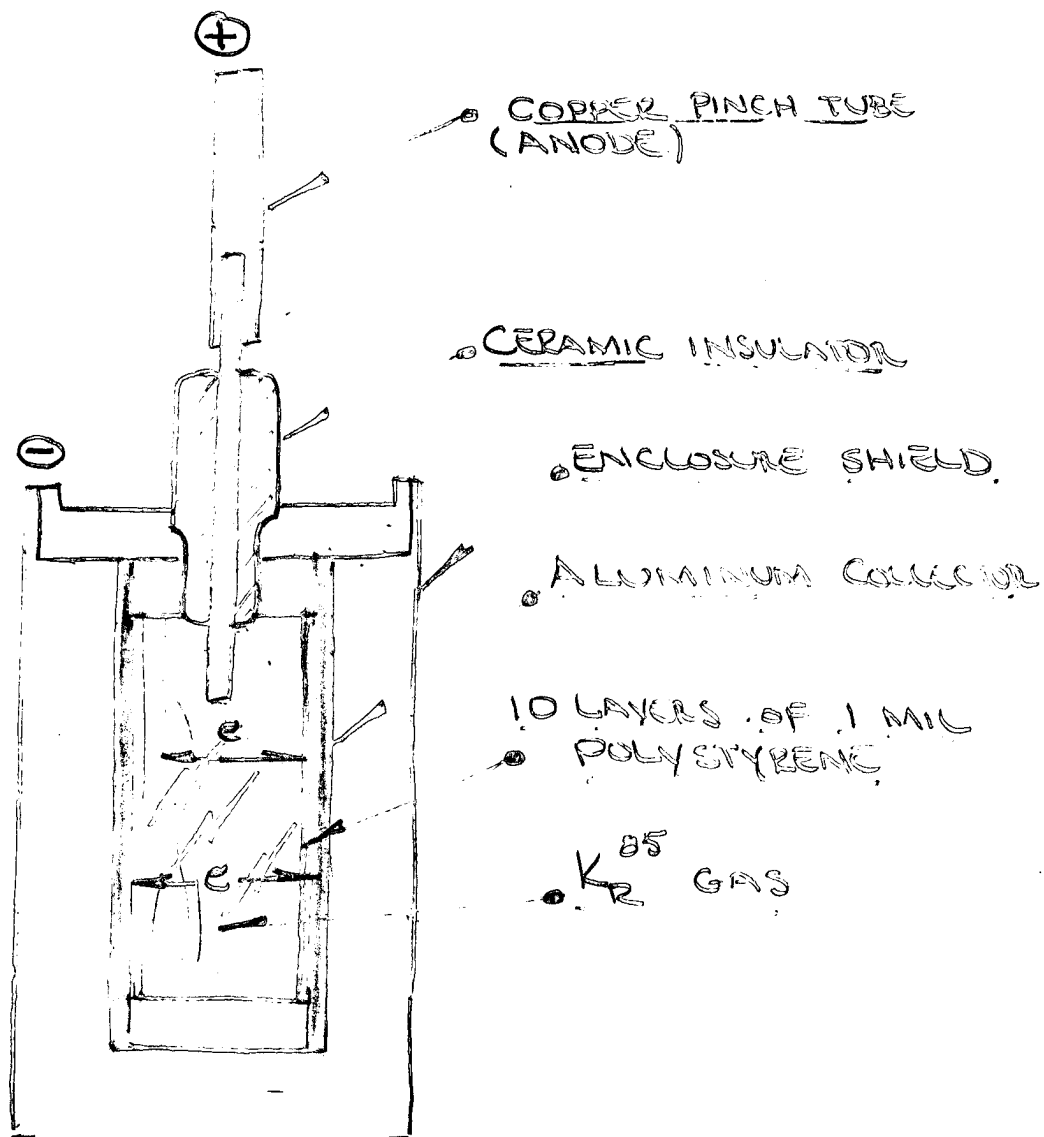
30 DAY - 1 YEAR NUCLEAR TIMER
CIRCUIT DIAGRAM



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NUCLEAR BATTERY

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